A Proposal for Long Term Development of Renewable Energy Generation in Arizona.

Presented by Tucson Electric Power – May 10, 2004

This Proposal is based on information in the report of the Cost Evaluation Working Group, information provided at Open Hearings and Workshops that have followed the CEWG effort, Environmental Portfolio Standard (EPS) program results from TEP's renewable energy development programs and published information regarding the results of renewable energy development programs of other states and countries, and includes consideration of:

1. The Commissioner's approved extension of the annual renewable energy percentage goal of the EPS to 1.1 percent in 2007.
2. Use of the existing solar biased EPS as the foundation of a revised and expanded Portfolio Standard appears to have strong support from stakeholders.
3. Substantial new information now available on emerging renewable energy technologies and energy storage technologies.
4. Additional information provided on the available, in-state renewable energy resource base.

Given these considerations, this proposal recommends the existing EPS be expanded to an Arizona specific renewable portfolio policy that would be based on two central concepts:

1. The existing EPS would be given proper financial support and be known as the Developmental Environmental Portfolio Standard or **DEPS** and would support an annual renewable energy generation goal of up to 1.1% of the annual retail electricity sold. Essentially this is the existing ***baseline*** element of the renewable generation program.

2. Renewable energy generation to meet any amount greater than 1.1% of annual retail electricity sold would be supported through revenue derived from a Purchased Power and Fuel Adjustor Clause if purchased from a independent power developer or rate based if utility developed. This renewable energy requirement would be stated through a Commercially Ready Renewable Energy Standard or **CRRES**

Background:

Tucson Electric Power (TEP) has been an active participant in the proceedings of the Environmental Portfolio Standard (EPS) and would like to respectfully take this opportunity to provide comments for consideration during development of changes to the EPS. We believe the EPS has been primarily responsible for providing the program and funds needed to lift Arizona to its rightful place as a national leader of solar energy generation development. The successful emphasis on development of Arizona's nearly limitless solar energy resources should not be abandoned at this early stage in EPS development. The Cost Evaluation Working Group (CEWG) report concludes "TEP and APS have acted carefully in the selection, design, installation and operation of their renewable generation resources, and have reasonably managed EPS financial resources". The CEWG members also reported a clear consensus that the EPS did not provide sufficient funding for all utilities to meet the EPS renewable energy goals in the timeframe required. TEP supports the policy and goals embodied in the Environmental Portfolio Standard and believes that the EPS should continue essentially as originally envisioned as one part of an overall renewable energy development program for Arizona. Successful aspects of the EPS program for your consideration include:

Financing Aspects of the Portfolio Standard:

- The Portfolio Standard funding mechanism allows for development of finance free renewable resource asset development as it supports "Pay as you Build" financing. By eliminating the financing costs of high initial cost, low operating cost generation like solar, a dramatic reduction in the life cycle cost of solar generation can be realized.
- In addition, the use of up front funding reduces the financial risk of entry into long term contracts for energy developed from a declining cost technology. Long term contracts entered into for energy from a declining cost technology like solar will always have a higher net present value per unit of energy than building the technology with the same cash flow as dollars are available. Long term contracts are appropriate when the technology has matured, the prices are stable and robust competition is supported.
- Utilities can take advantage of Federal Investment Tax Credits, providing 10% leverage on EPS funds by the federal government.
- Utilities can reinvest the revenues derived from sale of solar generated electricity at wholesale market rates at the time of production into additional funding for renewable generation in following years. As the amount of energy being developed from these renewable sources increases in future years, the solar energy revenues produced annually can approach the Portfolio Standard surcharge amount collected from customers, leveraging dollars invested today for future renewable development. These new dollars will be available for leverage as the cost of solar technologies declines in future years, further increasing the effectiveness of those revenues for funding solar generation development in the future. These revenues benefit all customers, not just those installing PV systems.

The Portfolio Standard is Meeting its Cost and Benefit Objectives:

- The costs of meeting the EPS are declining and the CEWG Report notes that the program is creating benefits, both expected and unexpected, for the citizens of Arizona.
- Arizona specific reductions in Balance of System costs are being created through innovative designs and construction practices at both utility scale PV installations and customer sited PV installations.
- It has been recognized from the beginning of development of the EPS that the costs of photovoltaics and other solar generation systems would be higher than the cost of conventionally fueled generation, but that the EPS would drive reductions in those costs as an investment in the energy future of Arizona. Those cost reductions are occurring, and many as a direct result of the Arizona EPS.

The Portfolio Standard has very aggressive solar energy percentage goals:

- When an ACC jurisdictional utility meets its post 2007 EPS goals they will have an installed solar generation capacity of at least 12 watts per person in their service territory
- The countries of Japan and Germany, considered to have the most aggressive national solar development programs in the world, have both recently reached a point where they each have a PV installed capacity of just over 4 watts per capita.
- TEP had an installed PV capacity of just over 6.0 watts per capita at the end of 2003, yet met about 60 percent of its 2003 Portfolio Standard annual renewable solar energy goal.
- TEP, after less than three years of implementing the EPS solar goals, was in 2003 producing more than twice the solar electricity per capita than the highly regarded solar development programs of Japan or Germany.
- The EPS has produced the development of over 8,000 kW of new solar Arizona located PV installations in just three short years.

Creation of a Database of the Intermittency of Renewable Resources:

- The Portfolio Standard is providing a wealth of real time data for use by utilities in understanding the characteristics of intermittent renewable resources like solar and wind.
- The utilities are beginning to use this data to determine the capacity value of intermittent resources.
- The utilities are beginning to use this data to develop resource forecasting methods,
- The utilities are developing the tools to analyze the data for use in integrating intermittent generation resources into the operational plan of generation dispatch.

Innovative Utility Business Plans are Creating New Markets for Solar Development:

- Large PV systems are up to 27% more energy productive than small PV systems and have much higher reliability factors as noted in the 2003 TEP Environmental Portfolio Programs Report submitted to the ACC in April 2004.
- The initial cost of a utility scale PV system on a $/watt basis is significantly lower than the initial cost of a small PV system, typically by 40 percent, reducing the impact on the economy of Arizona from loss of discretionary spending dollars by PV purchasing consumers - an effect not considered in the impact analysis of the CEWG.
- A TEP financial model analysis, presented to the Commission in April 2004, demonstrated conclusively that providing a subsidy in 2004 of $2 per AC watt for customer sited PV systems through the SunShare Option 1 program produced Portfolio Standard Solar credits at a cost higher than the cost of Portfolio Standard Solar credits produced at the Springerville Generating Station Solar System through utility scale solar systems installed in 2004.

Operational Data Feedback is Moving the Solar Industry Forward:

- Customer sited and utility scale PV system operational data from TEP's fleet of solar generators is shared with interested manufacturers, installers, national research laboratories and customers.
- TEP is the only Arizona utility to monitor and record real time operating data from customer sited PV systems.
- This has resulted in improvements in inverter reliability and performance of both small and large inverters in the Arizona operating environment.
- TEP is one of very few utilities working with Sandia National Labs to populate a national database of solar generation reliability and operating costs, to improve the ability to predict long term cost of PV ownership.
- TEP has the only Arizona facility where customers can visit to see a wide variety of typical customer sited solar generation systems in operation to compare possible options for their application.
- This facility is developing operational performance data on systems with various combinations of six different types of inverters and over a dozen different types of PV modules in the Arizona climate.

DEPS Program Concept Proposal:

It is proposed the DEPS is to be funded from the DEPS Surcharge collected from ratepayers and will continue with the existing EPS rules, except as funding provision modifications are proposed below. ***It is proposed the Commission will return demand side management (DSM) funds to the purpose originally intended.***

<u>Increasing Surcharge Funds</u>

The CEWG report noted the existing Surcharge rate does not provide sufficient funds for the utilities to meet the 1.1 percent goal on the schedule contained in the Environmental Portfolio Standard rule. This proposal supports returning DSM funds for their original purpose and adequately funding the DEPS 1.1 percent requirement. To avoid large increases in the surcharge, this proposal assumes that the utilities will meet the 1.1 percent requirement between 2010 and 2012 instead of on the schedule included in the current Environmental Portfolio Standard.

To provide sufficient funds for the utilities to meet the DEPS 1.1 percent requirement, the portfolio surcharge rate could be revised and caps increased to provide adequate funding for each utility to meet the DEPS program goals. In no case should the utilities be required to incur costs for the DEPS that would be deferred to a future rate recovery period.

Table 1 represents a proposed DEPS surcharge plan for TEP that will provide sufficient DEPS funding to provide a very high opportunity for program success based on:

- ***Increasing the surcharge rate from $0.000875 per kWh to $0.0025 per kWh;***
- ***Increasing the residential customer cap to $1.00 per month;***
- ***Increasing the small commercial customer cap to $30.00 per month and;***
- ***Increasing the large commercial customer cap to $120.00 per month.***

Table 1
Proposed DEPS Surcharge Rate for TEP

Customer Group	Historical Data		Illustrative Rate Option
	2003 MWH sales	Actual 2003 surcharge revenues with current caps	Surcharge rate of $0.0025 per kWh rate with cap of $120 per month for largest customers, $30 per month for small commercial and $1 per month for residential customers (2003 MWH sales)
Residential	3,370,540	$1,234,900	$3,528,286
Non-residential under 3 Mw	3,247,009	$1,227,803	$3,157,208
Non residential 3 MW +	1,612,004	$30,368	$93,440
Total	8,229,553	$2,493,071	$6,778,934

Distributed Generation and Utility-Scale Components of the DEPS

Arizona's EPS policy is of an energy based and "bottom-up" form where the utilities collect the surcharge funds, set program goals and standards and decide, based on least cost/most benefit criteria, which projects will be funded to meet the EPS annual renewable energy credit goals. Nearly all other states used a capacity based and "top-down" form in that a government or regulatory agency collects funds to be used for portfolio standard policy purposes, sets rules for the program and dispenses funds to qualifying project owners or developers. Recently, many other states have adopted the Arizona energy based renewable portfolio concept.

As noted in the Background, Arizona's approach has resulted in much faster development of solar generation from a combination of:

- A significant increase in very cost effective utility-scale solar generation projects which are non-existent in other states, but are developing overseas.
- Truly significant reductions in installed large-scale system costs (especially balance of system costs).
- Successful customer sited solar generation subsidy and support programs.

This approach has to date resulted in significantly higher overall levels of installed solar electric generation on a per capita basis for TEP as compared to any state or country with a solar generation development program. The TEP distributed generation support and subsidy program is built around a core of sustainable growth of customer confidence over a 10 year period of time, with stable and predictable subsidy levels declining after a stable market has been established through standards developed to promote safety, reliability and predictable performance.

The program driving increased rate of solar development at the utility scale has had a positive impact in the development of customer sited solar generation systems. In the first three years of the distributed generation market developed by the TEP SunShare customer sited PV subsidy program, customer sited solar electric generation has developed at more than twice the installed PV kW DC capacity rate of development of the first three years of the California renewable subsidy programs on a per capita basis, even though the program offers subsidies at least 35% lower than the California program.

Although the SunShare program has produced customer sited solar generation growth rates more than twice those of the California solar development program, the solar industry feels that customer sited solar generation installation rates could be improved by paying higher subsidies for PV and solar hot water heating installations. AriSEIA has proposed a Uniform EPS Credit Purchase Program. The program has numerous elements that TEP agrees would certainly increase the rate of customer sited solar generation development, but at a higher overall long term cost per kWh than the current TEP solar programs. An unintended consequence of implementing a Uniform EPS Credit Purchase Program would be production of less annual solar energy from the same amount of DEPS funding, and reduced levels of customer support.

AriSEIA proposed a workshop process to develop guidelines for the Uniform EPS Credit Purchase Program. While TEP is fundamentally opposed to implementation of a "One Size Fits All" program, we look forward to the opportunity to participate in the workshop process to clear up misconceptions surrounding the SunShare program that were evident in the AriSEIA program proposal.

It is recommended that all customer based distributed renewable energy generation programs shall provide for building customer satisfaction and public confidence in renewable energy generation. To build that confidence, each utility should set standards relating to safety, reliability and factors affecting the annual specific energy output performance of the distributed generation or solar hot water heating system, which may differ between utilities. It is also recommended that all distributed generation systems qualifying for subsidies would have the solar generation output metered by a revenue quality meter and metered data would be used for determining expected distributed generation output for all annual energy production DEPS purposes, rather than use predicted or model data. As a result of questions surrounding actual annual solar energy production, California recently adopted the metering requirement for their "Emerging Renewables Program", a qualification the SunShare program has included since first implementation.

The CEWG report noted the positive impact of development of a solar industry in Arizona in developing jobs. While TEP agrees that jobs are being created by the EPS, the impact evaluation was performed on a very narrowly defined scope of the EPS program, not on the full impact to the Arizona economy. It should be noted that the maximum benefit of any Arizona solar development program will be realized only if the manufacture of the solar modules and inverters is performed in Arizona. The effect of in state manufacturing and the impact of any customer funding provided for customer sited systems beyond the EPS surcharge use need to be completely evaluated before specific job creation numbers are used for the purpose of program decisions.

DEPS Termination Date

The DEPS has very specific technology percentage goal set asides for solar energy technologies. The solar technology set aside percentage appropriately provides strong support for development of Arizona's best and most ubiquitous renewable energy resource, the sun. The approved termination date of the EPS at the end of 2012 was designed to provide incentives for development of solar energy of sufficient duration to effect the commercialization of solar technologies in Arizona, while providing surety to customers that the surcharge was temporary. Technology set asides preclude development of other, possibly more promising technologies in the future. It should not be the goal of public utilities using customer funds to provide indefinite support for a specific developmental technology. Consequently, it is proposed that the DEPS terminate in 2012 as originally planned. If a developmental technologies program is proposed to provide selective support for a generation technology after 2012, it should be implemented as a separate program distinct from the DEPS.

CRRES Proposed Structure:

The CEWG Report showed that two renewable energy projects had a net positive cost/benefit effect – the TEP landfill gas to energy project developed to meet a voluntary renewables goal of 5 MW by 2000 set by the Commission in 1993; and the solar trough hot water project at a prison north of Phoenix developed by the prison operator. During ACC sponsored workshops, a number of other cost stable, mature technology industries including wind, geothermal and biomass power systems provided data showing resources in support of their technologies to be available in Arizona and potentially competitive with conventional electricity generation options. Generation capacity from these technologies could be used to meet an increased renewable energy percentage established by a Commercially Ready Renewable Energy Standard (CRRES). The CRRES would have a term of at least 30 years to allow certainty in long term renewable energy contract development.

A major question posed by the Commissioners was how much the EPS generation annual renewable energy percentage could be increased beyond 1.1% based on the Arizona renewable resources and renewable energy that could be imported into the state and at what cost. A related question based on consideration of the commercially ready renewable generation is when the utilities should be required to add such generation as part of their portfolio. As there is currently very little verified scientific data upon which to base such a decision, it is proposed these questions should be answered by the results of a realistic assessment of the amount of renewable electricity that can be developed in Arizona in a timely and cost effective manner. The assessment should include:

- A determination of the actual amount and location of renewable resources which are economically viable and can realistically be permitted for development
- A determination of how much additional generation capacity and consequential annual energy from these commercially ready renewable generation options the existing transmission infrastructure can accommodate
- A determination of the costs of reliably integrating these generation resources into the existing generation portfolio
- A determination of the costs and schedule constraints associated with development of transmission to bring new renewable energy resources, both inside and outside Arizona, to the Arizona retail energy customers
- Development of a realistic schedule of renewable resource generation installation including consideration of the permitting and installation schedules for development of transmission needed to bring the renewable energy generation to the population centers of Arizona
- Development of a schedule of anticipated cost to the customers of Arizona to incorporate the renewable generation, support increased transmission requirements and provide for renewable generation integration into the existing generation portfolio.

It is proposed that this assessment be performed expeditiously and the results of this study be used to set the CRRES annual renewable energy percentage goal schedule, starting with zero in 2006 and increasing by year from 2007 through 2012 with a schedule for annual percentage development increases supported by the study recommendations. It is also proposed that to allow for maximum flexibility in developing new renewable resources, that excess CRRES renewable energy credits produced in a given year could be banked for use in any of the following ten years, at which time those credits would expire.

Information provided at the Phoenix, Tucson and Flagstaff public comment workshops indicated a sustainable resource level of about 1,000 MW of additional generation capacity is realistically available from in-state wind sites and up to 60 MW of biomass sites, and it was noted that new transmission would be needed to fully develop this resource. Presenters representing wind and biomass developers indicated this new renewable capacity could be available for electricity generation by 2010. However, much of the information regarding wind resources was derived from computer generated models which must be verified with on site field data and doubt was expressed at some of the public hearings regarding the level of certainty surrounding the rate at which these renewable resources can be developed, licensing timelines, transmission development and financing of both wind and biomass projects. Indeed, some forest waste resource presenters in Flagstaff raised significant uncertainty about the size of potential national forest waste resources on a sustainable basis given a possible shift in future forest health management policies.

Experience in other states has demonstrated that the actual development of available renewable generation resources is not 100% successful from project inception through to energy delivery and it is recommended there be a mechanism to modify CRRES annual renewable energy production goals if the renewable resource generation projects can not be permitted, financed or transmission obtained in a timely manner through no fault of the utility. Experience in Texas and New Mexico has shown increasing voltage instability issues at the grid level from implementation of intermittent renewable energy resources. Resolution of the causative factors creating grid instability issues should be included in the scope of Arizona's renewable energy plans.

It is proposed that if the ACC establishes a percentage of annual retail electricity sales to be met through use of commercially ready renewable generation technologies in the years 2007 through 2012 and thereafter, that the utilities be authorized to recover the costs of generation, transmission and integration of the renewable resources developed, or purchased through an energy auction process, in meeting the goals of the CRRES. Typically, these mature, stable cost renewable generation systems produce electricity at rates slightly above market. To provide rate surety protection for customers, the Commission could put a cap on the impact on customer rates above which additional renewable resources would not be developed by that utility Utilities could apply for a waiver from the CRRES annual renewable energy goals if best case efforts to develop or purchase the renewable generation resources have not been successful through events not under the utilities control, including the implementation of an ACC imposed renewable energy rate cap on the CRRES.

It is proposed that to recover the cost of generating, transmitting and integrating additional renewable generation that each utility would be required to propose cost recovery mechanisms in a rate case or other appropriate forum for ACC review and approval to meet the CRRES goal. It is proposed that utilities structure their rates to recover the costs of implementing the CRRES through a Purchased Power and Fuel Adjustor Clause (PPFAC) charge on customer monthly bills authorized by the Commission. It is recommended that the ACC would approve all CRRES contracts and application of those recoverable cost increments to the PPFAC structure prior to final contract ratification by the utility.

It is recommended that recoverable costs are those incremental renewable energy costs in excess of energy and capacity costs avoided by renewable energy and its associated capacity. Recoverable costs shall include all costs associated with integration of the resource into the grid, including losses, transaction costs, intermittency mitigation and transmission costs, among other such costs associated with purchase or development of renewable generation sources. If a purchase of Renewable Energy Credits, RECs, were approved by the Commission and used to meet the CRRES requirements, those would be calculated at cost in determining the PPFAC impact. A utility should propose to the Commission a method for determining recoverable costs in each renewable energy contract, if such costs are not automatically avoided through a fuel and purchased power adjustor.

There would be no multipliers for any renewable technologies over any other renewable technology for purpose of evaluating the bids for the CRRES. Evaluation of CRRES source bids should include a factor for “In Arizona” economic benefits of renewable resource generators located in Arizona when comparison to out of state renewable resource bids was made for purpose of contract award. However, these factors would not be included in determining the above market costs to be included in the PPFAC recovery amount. The “In Arizona” economic benefit factor would be developed by each utility and approved by the ACC prior to application in bid evaluations.

In Conclusion:

Tucson Electric Power appreciates this opportunity to provide comments for consideration by the Commission in developing changes to the existing Environmental Portfolio Standard. We believe this proposal embodies concepts which, if implemented, will support Arizona’s continued deliberative, achievement based leadership in development of renewable energy resources. The conceptual scope of challenges to further development of renewable energy resources in Arizona has been defined and we must now develop the detailed solutions in response to these challenges: renewable resource size and location; additional transmission requirements; voltage stability support; generation system integration; and full recovery of increases in cost balanced with effects on the economy of Arizona. We look forward to working with the Commission and staff in the future, defining solutions to these details while striking an Arizona appropriate renewable economy balance.